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GEOMETRY.

126. Proposed by **GEORGE R. DEAN**, Professor of Mathematics, University of Missouri School of Mines and Metallurgy, Rolla, Mo.

Through any fixed point O draw two straight lines at right angles. Let one line cut a given circle at Q , the other at R . Find, by Euclidean methods, the locus of the foot of the perpendicular from O upon the chord QR . Give complete analysis and discussion. Solve also by coördinate geometry.

127. Proposed by **WILLIAM HOOVER**, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, O.

The equation to the plane through the extremities, (x_1, y_1, z_1) , (x_2, y_2, z_2) , (x_3, y_3, z_3) , of conjugate diameters of the ellipsoid,

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 \text{ is } \frac{x_1+x_2+x_3}{a^2}x + \frac{y_1+y_2+y_3}{b^2}y + \frac{z_1+z_2+z_3}{c^2}z = 1.$$

* * Solutions of these problems should be sent to B. F. Finkel not later than November 10.

CALCULUS.

97. Proposed by **ARTEMAS MARTIN**, A. M., Ph. D., LL. D., U. S. Coast and Geodetic Survey Office, Washington, D. C.

An augur hole radius r is bored through a prolate spheroid; the axis of the augur passing through the center, perpendicular to the major axis. Find the volume removed.

98. Proposed by **CHARLES CARROLL CROSS**, Whaleyville, Va.

On the circumference of a fixed circle radius R rolls a circle radius r . Required the length of the curve described by a point on the circumference of the rolling circle; (1) when the circle rolls on the inside; (2) when the circle rolls on the outside of the circumference of the fixed circle.

* * Solutions of these problems should be sent to J. M. Colaw not later than November 10.

MECHANICS.

97. Proposed by **G. B. M. ZERR**, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

The side AB of the parallelogram $ABCD$ will be a principal axis at the point which divides the distance between the middle point and the foot of the perpendicular from the middle-point of the opposite side in the ratio $2 : 1$. The principal moments of inertia about this point are $\frac{1}{3}mb^2\sin^2\beta$, $\frac{1}{6}m(3a^2+4b^2\cos^2\beta)$, where $\beta = \angle A$.

98. Proposed by **WALTER H. DRANE**, Graduate Student, Harvard University, Cambridge, Mass.

A spool, with light thread wound around, is placed upon a rough table so that the thread will emerge from beneath the spool. The thread is passed over a smooth pulley at end of table and a weight attached, the pulley being so adjusted that thread is parallel to surface of table. If friction between spool and table is sufficient to prevent slipping, de-